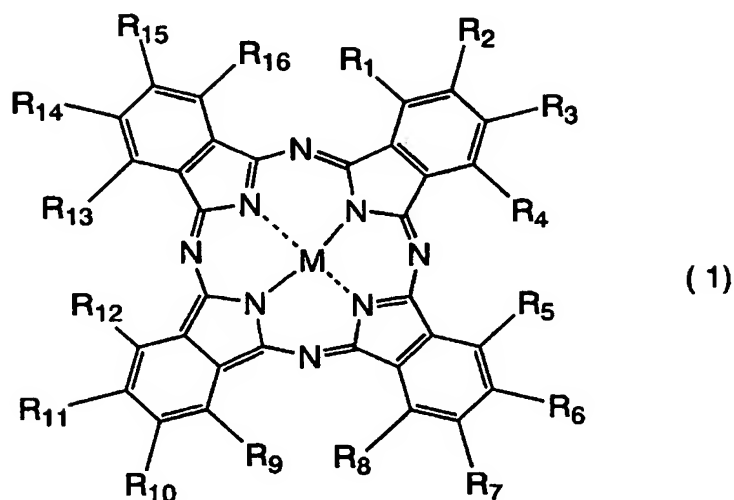


Claims

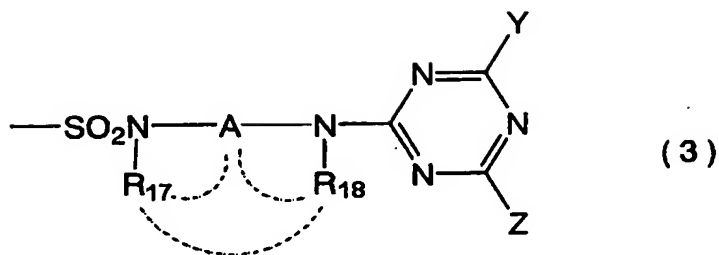
1. A phthalocyanine colorant represented by Formula (1):



5 [in Formula (1), M represents a hydrogen atom, a metal atom, a metal oxide, a metal hydroxide, or a metal halide; R₂, R₃, R₆, R₇, R₁₀, R₁₁, R₁₄ and R₁₅ each independently represent an unsubstituted sulfamoyl group represented by Formula (2), a substituted sulfamoyl group represented by Formula (3), or a hydrogen atom, provided that

10 at least one of R₂, R₃, R₆, R₇, R₁₀, R₁₁, R₁₄ and R₁₅ is an unsubstituted sulfamoyl group, and at least one thereof is a substituted sulfamoyl group represented by Formula (3); and R₁, R₄, R₅, R₈, R₉, R₁₂, R₁₃ and R₁₆ represent hydrogen atoms; the sum of a number of an unsubstituted sulfamoyl group and a number of a substituted

15 sulfamoyl group is 2 to 4, and a number of an unsubstituted sulfamoyl group is 1 to 3 and a number of a substituted sulfamoyl group is 1 to 3.]:

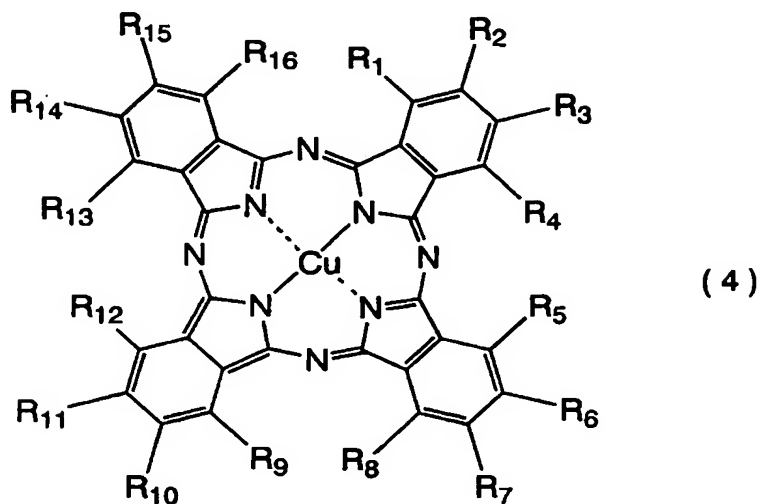


[in Formula (3), R_{17} and R_{18} each independently represent a hydrogen atom, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heterocyclic group, and a substituted or unsubstituted alkenyl group; A represents a crosslinking group, and adjacent R_{17} , R_{18} and A may form a ring by bonding together; Y and Z each independently represent a halogen atom, a hydroxyl group, a sulfonic acid group, a carboxyl group, an amino group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted cycloalkyloxy group, a substituted or unsubstituted aryloxy group, a substituted or unsubstituted heterocyclic oxy group, a substituted or unsubstituted alkenyloxy group, a substituted or unsubstituted alkylamino group, a substituted or unsubstituted cycloalkylamino group, a substituted or unsubstituted arylamino group, a substituted or unsubstituted heterocyclic amino group, a substituted or unsubstituted alkenylamino group, a substituted or unsubstituted dialkylamino group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted arylthio group, a substituted or unsubstituted heterocyclic thio group, a substituted or unsubstituted alkenylthio group, provided that at least one of Y

and Z is a group having an ionic and hydrophilic group as a substituent.]

2. The phthalocyanine colorant according to Claim 1, wherein Formula (1) according to Claim 1 is represented by Formula (4)

5 wherein M is Cu:



[wherein R₁ to R₁₆ mean the same as in Formula (1)].

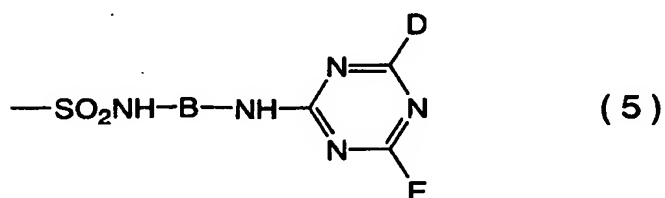
10 3. The phthalocyanine colorant according to Claim 1 or 2, wherein the crosslinking group A is an alkylene, a cycloalkylene, or an arylene group.

15 4. The phthalocyanine colorant according to any one of Claims 1 to 3, wherein in each of combinations of R₂ and R₃, R₆ and R₇, R₁₀ and R₁₁, and R₁₄ and R₁₅, one member of each combination is a hydrogen atom, and the other is an unsubstituted sulfamoyl group represented by Formula (2), a substituted sulfamoyl group represented by Formula (3) or a hydrogen atom, and among R₂, R₃, R₆, R₇, R₁₀, R₁₁, R₁₄ and R₁₅, at least one is an unsubstituted sulfamoyl group and at least one is a substituted sulfamoyl group represented

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by Formula (3).

5. The phthalocyanine colorant according to Claim 1 or 2, wherein a substituted sulfamoyl group of Formula (3) is a group represented by Formula (5) as shown below:



[in Formula (5), B represents an alkylene, arylene, or xylylene group; D and E each independently represent a chlorine atom, a hydroxyl group, a sulfonic acid group, a carboxyl group, an amino group, an alkoxy group (which may be substituted with a substituent selected from a group consisting of a sulfonic acid group, a carboxyl group, a hydroxyl group, a dialkylamino group, an arylamino group, an acetylamino group, an alkoxy group, an aryl group, a cyano group and a halogen atom), a phenoxy group (which may be substituted with one or two or more substituents selected from a group consisting of a sulfonic acid group, a carboxyl group, a ureide group, an alkyl group and an alkoxy group), a naphthoxyl group (which may be substituted with one or two or more substituents selected from a group consisting of a sulfonic acid group and an acetylamino group), a benzyloxyl group (which may be substituted with a sulfonic acid group), a phenetyloxyl group (which may be substituted with a sulfonic acid group), an alkylamino group (which may be substituted with a substituent selected from a group consisting of a sulfonic acid group, a carboxyl group, a hydroxyl

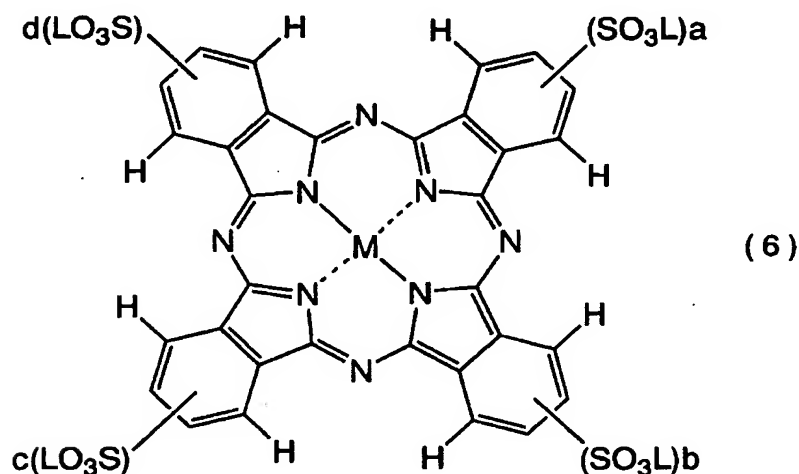
group, an alkoxy group, a dialkylamino group, an arylamino group, an aryl group, a halogen atom and a cyano group), an anilino group (which may be substituted with one or two or more substituents selected from a group consisting of a sulfonic acid group, a carboxyl group, a hydroxyl group, a dialkylamino group, an arylamino group, an acetylamino group, a ureide group, an alkyl group, an alkoxy group, a nitro group, a cyano group, a heterocyclic group and a halogen atom), a naphthylamino group (which may be substituted with a sulfonic acid group or a hydroxyl group), a benzylamino group (which may be substituted with a sulfonic acid group), a phenethylamino group (which may be substituted with a sulfonic acid group), an alkylthio group (which may be substituted with a sulfonic acid group, a carboxylic group or a hydroxyl group), or an arylthio group (which may be substituted with one or two or more substituents selected from a group consisting of a sulfonic acid group, a carboxyl group, a hydroxyl group, and an alkyl group), and at least one of D and E has, as a substituent, an ionic and hydrophilic group selected from a group consisting of a sulfonic acid group and a carboxyl group.]

20 6. The phthalocyanine colorant according to Claim 1, wherein either one of Y and Z is an amino group, or a substituted or unsubstituted alkylamino group, and the other is a group other than a halogen and a hydroxyl group.

25 7. The phthalocyanine colorant according to Claim 6, wherein a group other than a halogen and a hydroxyl group is an arylamino group substituted with a sulfonic acid group.

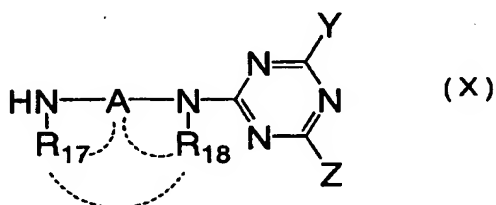
8. The phthalocyanine colorant according to Claim 1, wherein content of a colorant of Formula (1) is at least 60% based on the total amount of colorants.

9. The phthalocyanine colorant according to any one of Claims 1 to 8, wherein the colorant of Formula (1) is obtained by subjecting the phthalocyanine colorant or the salt thereof represented by Formula (6) to a reaction with a chlorinating reagent to convert a sulfonic acid group to a chlorosulfonic acid group, followed by further reaction with an organic amine represented by Formula (X) as shown below and an amidating reagent:



10 [in Formula (6), M represents a hydrogen atom, a metal atom, a metal oxide, a metal hydroxide or a metal halide; L represents a hydrogen atom, an alkali metal ion, an alkali earth metal ion, an onium ion of an organic amine or an ammonium ion; a, b, c and d is 0 or 1, and the sum thereof is an integer of 2 to 4.]:

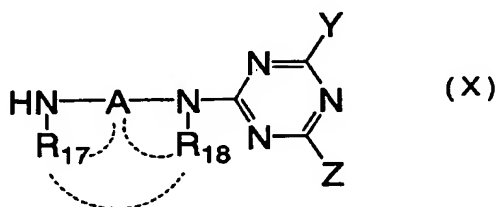
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[in Formula (X), R_{17} and R_{18} each independently represent a hydrogen atom, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heterocyclic group, and a substituted or unsubstituted alkenyl group; A represents a crosslinking group, and adjacent R_{17} , R_{18} and A may form a ring by bonding together; Y and Z each independently represent a halogen atom, a hydroxyl group, a sulfonic acid group, a carboxyl group, an amino group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted cycloalkyloxy group, a substituted or unsubstituted aryloxy group, a substituted or unsubstituted heterocyclic oxy group, a substituted or unsubstituted alkenyloxy group, a substituted or unsubstituted alkylamino group, a substituted or unsubstituted cycloalkylamino group, a substituted or unsubstituted arylamino group, a substituted or unsubstituted heterocyclic amino group, a substituted or unsubstituted alkenylamino group, a substituted or unsubstituted dialkylamino group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted arylthio group, a substituted or unsubstituted heterocyclic thio group, a substituted or unsubstituted alkenylthio group, provided that at least one of Y and Z is a group having an ionic and hydrophilic group as a substituent.]

10. A phthalocyanine colorant, which is obtained by subjecting derivatives of 4-sulfophthalic acid to reaction with themselves or subjecting a derivative of 4-sulfophthalic acid to reaction with a derivative of a phthalic acid (anhydride) in the presence of a metallic compound to obtain a sulfometallo

phthalocyanine compound, which is reacted with a chlorinating reagent to convert a sulfonic acid group to a chlorosulfonic acid group, followed by further reaction with an amidating reagent and an organic amine represented by Formula (X) as shown below:



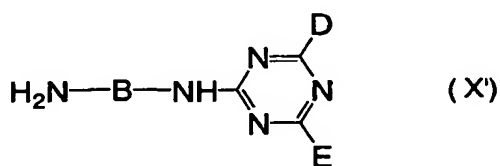
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[in Formula (X), R_{17} , R_{18} , A, Y and Z represent the same meaning as described above.]

11. The phthalocyanine colorant according to Claim 10, wherein the crosslinking group A is an alkylene, a cycloalkylene, or an arylene group.

12. The phthalocyanine colorant according to Claim 10 or 11, wherein the organic amine represented by Formula (X) is represented by Formula (X') as shown below:

15



[in Formula (X'), B represents an alkylene, an arylene, or a xylylene group; D and E each independently represent a chlorine atom, a hydroxyl group, a sulfonic acid group, a carboxyl group, an amino group, an alkoxy group (which may be substituted with a

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substituent selected from a group consisting of a sulfonic acid group, a carboxyl group, a hydroxyl group, a dialkylamino group, an arylamino group, an acetylamino group, an alkoxy group, an aryl group, a cyano group and a halogen atom), a phenoxyl group (which
5 may be substituted with one or two or more substituents selected from a group consisting of a sulfonic acid group, a carboxyl group, a ureide group, an alkyl group and an alkoxy group), a naphthoxyl group (which may be substituted with one or two or more substituents selected from a group consisting of a sulfonic acid group and an
10 acetylamino group), a benzyloxyl group (which may be substituted with a sulfonic acid group), a phenetyloxyl group (which may be substituted with a sulfonic acid group), an alkylamino group (which may be substituted with a substituent selected from a group consisting of a sulfonic acid group, a carboxyl group, a hydroxyl
15 group, an alkoxy group, a dialkylamino group, an arylamino group, an aryl group, a halogen atom and a cyano group), an anilino group (which may be substituted with one or two or more substituents selected from a group consisting of a sulfonic acid group, a carboxyl group, a hydroxyl group, a dialkylamino group, an
20 arylamino group, an acetylamino group, a ureide group, an alkyl group, an alkoxy group, a nitro group, a cyano group, a heterocyclic group and a halogen atom), a naphthylamino group (which may be substituted with a sulfonic acid group or a hydroxyl group), a benzylamino group (which may be substituted with a sulfonic acid
25 group), a phenethylamino group (which may be substituted with a sulfonic acid group), an alkylthio group (which may be substituted with a sulfonic acid group, a carboxylic group or a hydroxyl group), or an arylthio group (which may be substituted with one or two or more substituents selected from a group consisting of a sulfonic

acid group, a carboxyl group, a hydroxyl group and an alkyl group); and at least one of D and E has, as a substituent, an ionic and hydrophilic group selected from a group consisting of a sulfonic acid group and a carboxyl group.]

5 13. The phthalocyanine colorant according to any one of Claims 10 to 12, wherein the metallic compound is a copper compound.

 14. An ink characterized by comprising, as a colorant component, the phthalocyanine colorant according to any one of Claims 1 to 13.

10 15. The ink according to Claim 14, which comprises an organic solvent.

 16. The ink according to Claims 14 or 15, which is for ink-jet recording use.

15 17. An ink set characterized by using the ink according to any one of Claims 14 to 16 as at least one kind in an ink-jet printer which uses at least two kinds of cyan inks having different colorant concentrations.

20 18. An ink-jet recording method characterized by using, as an ink, the ink or the ink set according to any one of Claims 14 to 17, in an ink-jet recording method wherein recording is conducted onto a recording material by jetting ink droplets in response to recording signals.

25 19. The ink-jet recording method according to Claim 18, wherein the recording material is a sheet for information transmission.

 20. The ink-jet recording method according to Claim 19, wherein the sheet for information transmission is a surface-treated sheet and a sheet having an ink image receiving layer which contains white inorganic pigment particles on a backing material.

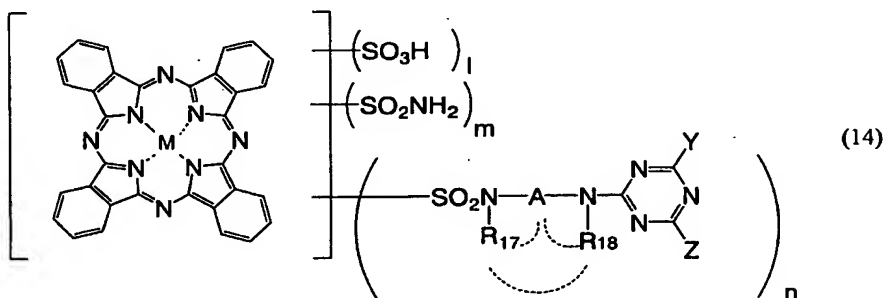
21. A container comprising the ink or the ink set according to any one of Claims 14 to 17.

22. An ink-jet printer comprising the container according to Claim 21.

5 23. A colored product which is colored with the ink or the ink set according to any one of Claims 14 to 17.

24. A method for producing a phthalocyanine colorant characterized by being obtained by
 10 subjecting derivatives of 4-sulfophthalic acid to reaction with themselves or subjecting a derivative of 4-sulfophthalic acid to reaction with a derivative of a phthalic acid (anhydride) in the presence of a copper compound to obtain a compound or a salt thereof, which is reacted with a chlorinating reagent to convert a sulfonic acid group to a chlorosulfonyl group, followed by further reaction
 15 with an organic amine represented by the above Formula (X) and an amidating reagent.

25. A phthalocyanine colorant which has not less than 60% of a compound substituted at the β -position and not more than 40% of a compound substituted at the α -position in a phthalocyanine
 20 colorant represented by Formula (14) as shown below:



[wherein M represents a hydrogen atom, a metal atom, a metal oxide,

a metal hydroxide or a metal halide; l includes 0 and lower than 1; m is not smaller than 0.5 and not larger than 3; n is not smaller than 1 and not larger than 3.5, and the sum of l, m and n is not smaller than 2 and not larger than 4; R₁₇ and R₁₈ each independently
5 represent a hydrogen atom, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heterocyclic group, and a substituted or unsubstituted alkenyl group; and A represents a crosslinking group,
10 and adjacent R₁₇, R₁₈ and A may form a ring by bonding together; Y and Z each independently represent a halogen atom, a hydroxyl group, a sulfonic acid group, a carboxyl group, an amino group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted cycloalkyloxy group, a substituted or unsubstituted
15 aryloxy group, a substituted or unsubstituted heterocyclic oxy group, a substituted or unsubstituted alkenyloxy group, a substituted or unsubstituted alkylamino group, a substituted or unsubstituted cycloalkylamino group, a substituted or unsubstituted arylamino group, a substituted or unsubstituted
20 heterocyclic amino group, a substituted or unsubstituted alkenylamino group, a substituted or unsubstituted dialkylamino group, a substituted or unsubstituted alkylthio group, a substituted or unsubstituted arylthio group, a substituted or unsubstituted heterocyclic thio group, a substituted or
25 unsubstituted alkenylthio group, provided that at least one of Y and Z is a group having an ionic and hydrophilic group as a substituent.]

26. The phthalocyanine colorant according to Claim 25, wherein either one of Y and Z is an amino group, or a substituted

or unsubstituted alkylamino group, and the other is a group other than a halogen and a hydroxyl group.

27. The phthalocyanine colorant according to Claim 25, wherein a group other than a halogen and a hydroxyl group is an
5 arylamino group substituted with a sulfonic acid group.

28. The phthalocyanine colorant according to Claim 25, wherein M represents a copper atom; A represents a divalent crosslinking group having carbon atoms of 1 to 6; 1 includes 0 and smaller than 1; m is not smaller than 0.5 and not larger than 3;
10 n is not smaller than 1 and not higher than 3; and the sum of 1, m and n is 2 to 4; both R_{17} and R_{18} represent hydrogen atoms; Y and Z each independently represent an amino group, a substituted or unsubstituted alkylamino group, a substituted or unsubstituted arylamino group, a substituted or unsubstituted dialkylamino group,
15 provided that at least one of Y and Z is a group having an ionic and hydrophilic group as a substituent.